

Name: _____ Date: _____ Period: _____

Free Body Diagrams

Bell Ringer:

Determine if the forces in the following situations are balanced or unbalanced

- A book sitting on a table
- A car accelerating down the highway
- A hockey puck moving at constant velocity across the ice.

Learning Target:

Words	What They Mean	The forces should...
"at rest" or "constant velocity"	No acceleration	Be balanced Cancel one another out $F_{net}=0$
"accelerating" "speeding up" "slowing down"	Accelerating	Unbalanced Some of the forces cancel out, but not all of them $F_{net}=ma$

Common Forces:

- $F_g \rightarrow$
- $F_N \rightarrow$
- $F_f \rightarrow$
- $F_p \rightarrow$
- $F_T \rightarrow$

Free Body Diagram:

Free Body Diagram Questions:

Question 1: Is the object accelerating?

Question 2: Should the forces be balanced or unbalanced?

Question 3: What forces are on the book? (look at list)

Question 4: What are the direction of these forces?

Problem 1:

A book is at rest on a table top. Draw the free body diagram of the book.

Question 1: Is the object accelerating?

Question 2: Should the forces be balanced or unbalanced?

Question 3: What forces are on the object? (look at list)

Question 4: What are the direction of these forces?



Problem 2:

Draw the free body diagram of a ball falling through the air.
(Ignore air resistance)

Question 1: Is the object accelerating?

Question 2: Should the forces be balanced or unbalanced?

Question 3: What forces are on the object? (look at list)

Question 4: What are the direction of these forces?



Problem 3:

Draw the free body diagram of a box being pushed on the floor to the right. (Ignore friction)

Question 1: Is the object accelerating?

Question 2: Should the forces be balanced or unbalanced?

Question 3: What forces are on the object? (look at list)

Question 4: What are the direction of these forces?



Problem 4

Draw the free body diagram of a chandelier hanging from the ceiling

Question 1: Is the object accelerating?

Question 2: Should the forces be balanced or unbalanced?

Question 3: What forces are on the object? (look at list)

Question 4: What are the direction of these forces?



Problem 5:

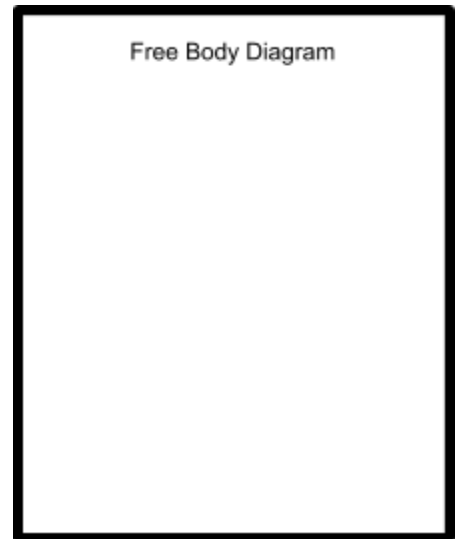
Draw the free body diagram of a box being pushed on the floor to the right. (Ignore friction)

Question 1: Is the object accelerating?

Question 2: Should the forces be balanced or unbalanced?

Question 3: What forces are on the object? (look at list)

Question 4: What are the direction of these forces?



Newton's Second Law Practice:

- 1) A 6 kg object undergoes an acceleration of 2m/s^2 . A) What is the magnitude of the resultant force acting on it? B) If this same force is applied to a 4 kg object, what acceleration is produced?

- 2) A football punter accelerates a football from rest to a speed of 10m/s during the time in which his toes is in contact with the ball for about 2 seconds, making the acceleration of the football 5m/s^2 . If the football has a mass of 0.5kg , what average force does the punter exert on the ball?

- 3) The heaviest invertebrate is the giant squid, which is estimated to have a mass of 10kg . What is its weight in Newtons?

- 7) The air exerts a forward force of 10N on the propeller of a 0.2kg model airplane. What is the plane's forward acceleration?